

103.1068.01

09/854,187

REMARKS:Status

After this response, claims 54, 56 to 98, 104, 105, 111 to 114, 121 to 124, 126 to 131, 133 to 141, and 143 to 147 are pending. Claims 54, 56, 62, 87, 104, 121 to 124, 126 to 131, 133 to 141, and 143 to 147 have been amended, and claims 52, 53, 55, 99 to 103, 106 to 110, 115 to 120, 125, 132 and 142 have been cancelled. Claims 54, 62, 82, 87, 104, 111, 114, 121, 131 and 141 are the independent claims. Reconsideration and further examination are respectfully requested.

Section 101 Rejection

Claims 54 to 61, 99 to 105, and 115 to 147 were rejected under 35 U.S.C. § 101. Of these, claims 54, 56 to 61, 104, 105, 121 to 124, 126 to 131, 133 to 141, and 143 to 147 are still pending. These claims have been amended to recite "[a] file system that stores and retrieves information." Applicants submit that such a file system is clearly statutory subject matter. Accordingly, withdrawal is respectfully requested of the rejection under § 101.

Section 102 and 103 rejections

All pending claims were rejected under 35 U.S.C. § 102 or § 103 over Raymond A. Lorie, "Physical Integrity in a Large Segmented Database," ACM Transactions on Database Systems, vol. 2, no. 1, Mar. 1997, pp 91-104 (Lorie), except for claims 64, 117, and 143. Applicants note that the language of these claims substantially matches language in claims that were rejected and also

103.1068.01

09/854,187

note that all claims are listed as rejected in the Disposition section of the Office Action Summary. Applicants have therefore proceeded on the basis that all claims were rejected under § 102 or § 103 over Lorie.

The claims are discussed below, grouped by independent claim.

Claim 52: This claim has been cancelled, rendering the rejection thereof moot.

Claim 53: This claim has been cancelled, rendering the rejection thereof moot.

Claims 54 and 56 to 61: Independent claim 54 is reproduced below:

54. (Currently Amended) A file system that stores and retrieves information in a plurality of storage blocks, said file system including a plurality of bits associated with each one of said plurality of storage blocks, at least one of said plurality of bits identifying whether said one storage block was part of said file system at a time earlier than a current consistent version of said file system, and at least a second one of said plurality of bits identifying whether said one storage block was part of said file system at a second time earlier than a current consistent version of said file system.

Lorie is not seen by Applicants to disclose or to suggest the foregoing features of claim 54, at least with respect to “identifying whether said one storage block was part of said file system at a second time earlier than a current consistent version of said file system” in combination with “identifying whether said one storage block was part of said file system at a time earlier than a current consistent version of said file system.”

Before this response, this feature was recited by claim 55. In the § 103 rejection of that claim, the Office Action stated the following:

Claim 55 merely reads on the fact that more than one bit is used to indicate status. Although Lorie does not specifically show more than one bit is used for representing the status of the segment, it would have been obvious

103.1068.01

09/854,187

to one of ordinary skill in the art to use any number of bits to identify a segment depending on users' requirements.

Lorie does not teach "identifying whether said one storage block was part of said file system *at a second time* earlier than a current consistent version of said file system" (emphasis added). Applicants further submit that the following text from section 3 on page 96 of Lorie teaches directly against this feature:

Let us suppose S_k is in a state of integrity (D_k) at time t and that a series of changes are made to S_k between time t and time $t + \Delta t$, at which time we decide to permanently store the new state D_k' onto disk. If a system failure occurs between t and $t + \Delta t$, we want to be able to return to the state D_k . If no failure occurs in that interval, the new state D_k' is recorded and D_k is forgotten.

In particular, Applicants submit that teaching that state " D_k is forgotten" is counter to a teaching of "identifying whether said one storage block was part of said file system *at a second time* earlier than a current consistent version of said file system" in addition to "identifying whether said one storage block was part of said file system at a time earlier than a current consistent version of said file system," as recited by claim 54.

For at least the foregoing reasons, claim 54 and its dependent claims are believed to be allowable over Lorie. Reconsideration and withdrawal are therefore requested of the rejections of those claims.

Claims 62 to 81: Independent claim 62 is reproduced below:

62. (Currently Amended) A file system having a plurality of storage blocks, said file system including a snapshot including a set of member storage blocks selected from said plurality, said member storage blocks forming a consistent file system other than an active file system, said snapshot being disposed as an object in said file system.

103.1068.01

09/854,187

Lorie is not seen by Applicants to disclose or to suggest the foregoing features of claim 62, at least with respect to "said snapshot being disposed as an object in said file system."

Lorie concerns a database system. The Office Action apparently has broadly read the database system to be equivalent to the claimed file system. The Office Action also has apparently read Lorie's "state of integrity" to be equivalent to the claimed snapshot. Applicants respectfully submit that given these equivalences, Lorie would have to teach that its "state of integrity" is stored as an object in Lorie's database in order to teach the claimed feature of "said snapshot being disposed as an object in said file system." Applicants see no such teaching in Lorie.

For at least the foregoing reasons, claim 62 and its dependent claims are believed to be allowable over Lorie. Reconsideration and withdrawal are therefore requested of the rejections of those claims.

Claims 82 to 86: Independent claim 82 is reproduced below:

82. (Previously Presented) A method of operating a file server, said method including steps for
forming a first snapshot of a first consistent state of said file system at a selected time, said first snapshot including an indication of a set of storage blocks in said first consistent state;
forming a second snapshot of a second consistent state of said file system, said second snapshot including an indication of a set of storage blocks in said second consistent state; and
performing an operation on said first and second snapshots to form a storage image including an indication of at least some storage blocks in said file system.

Lorie is not seen by Applicants to disclose or to suggest the foregoing features of claim 82, at least with respect to "performing an operation on said first and second snapshots to form a storage image including an indication of at least some storage blocks in said file system."

103.1068.01

09/854,187

Applicants submit that in order for such an operation to be performed, both snapshots must be present. However, Lorie's teaching that state " D_k is forgotten" appears to Applicants to teach against having both a first and a second snapshot present.

For at least the foregoing reasons, claim 82 and its dependent claims are believed to be allowable over Lorie. Reconsideration and withdrawal are therefore requested of the rejections of those claims.

Claims 87 to 98: Independent claim 87 is reproduced below:

87. (Currently Amended) A method to be performed in a file system, said file system having a plurality of storage blocks, said method including steps for

defining a storage image of a set of member storage blocks selected from said plurality, said storage image being formed based on a set of member storage blocks forming a consistent file system other than an active file system;

forming an image stream of a sequence of member storage blocks selected from said storage image; and

sending said image stream from a source file system to a destination file system.

Lorie is not seen by Applicants to disclose or to suggest the foregoing features of claim 87, at least with respect to "sending said image stream from a source file system to a destination file system."

Lorie concerns a database system. The Office Action apparently has broadly read the database system to be equivalent to the claimed file system. Applicants respectfully submit that given this equivalence, Lorie would have to teach sending an image stream from a source database to a destination database in order to teach "sending said image stream from a source file system to a destination file system." Applicants do not understand Lorie to be concerned with such a process.

103.1068.01

09/854,187

For at least the foregoing reasons, claim 87 and its dependent claims are believed to be allowable over Lorie. Reconsideration and withdrawal are therefore requested of the rejections of those claims.

Claims 99 to 103: These claims have been cancelled, rendering the rejections thereof moot.

Claims 104 and 105: Independent claim 104 is reproduced below:

104. (Currently Amended) Apparatus including a file system that stores and retrieves information, said file system including a plurality of snapshots thereof, each representing an associated consistent state at an associated selected time; and each said snapshot including an indication of a set of storage blocks in said associated consistent state, said indication being recorded in at least one storage block in said associated consistent state.

Lorie is not seen by Applicants to disclose or to suggest the foregoing features of claim 104, at least with respect to "said file system including a plurality of snapshots thereof, each representing an associated consistent state at an associated selected time." In particular, Lorie's teaching that state " D_k is forgotten" appears to Applicants to teach against having a plurality of snapshots.

For at least the foregoing reasons, claim 104 and its dependent claim are believed to be allowable over Lorie. Reconsideration and withdrawal are therefore requested of the rejections of those claims.

Claims 106 to 110: These claims have been cancelled, rendering the rejections thereof moot.

Claims 111 to 113: Independent claim 111 is reproduced below.

103.1068.01

09/854,187

111. (Previously Presented) In a file system having a plurality of storage blocks, a data structure including
a first snapshot of a set of member storage blocks selected from said plurality, said member storage blocks forming a consistent file system other than an active file system;
said first snapshot being represented as an object in said file system and having a set of storage blocks for recording said first snapshot;
whereby copying said member storage blocks in said first snapshot has the property of preserving at least one snapshot recorded in said file system at a time of said first snapshot.

Lorie is not seen by Applicants to disclose or to suggest the foregoing features of claim 111, at least with respect to "said first snapshot being represented as an object in said file system."

Loric concerns a database system. The Office Action apparently has broadly read the database system to be equivalent to the claimed file system. The Office Action apparently has also read Lorie's "state of integrity" to be equivalent to the claimed snapshot. Applicants respectfully submit that given these equivalences, Lorie would have to teach that its "state of integrity" is represented as an object in Lorie's database in order to teach the claimed feature of "said first snapshot being represented as an object in said file system." Applicants see no such teaching in Lorie.

For at least the foregoing reasons, claim 111 and its dependent claims are believed to be allowable over Lorie. Reconsideration and withdrawal are therefore requested of the rejections of those claims.

Claim 114: Independent claim 114 is reproduced below.

114. (Previously Presented) In a file system having a plurality of storage blocks, a data structure including

103.1068.01

09/854,187

a snapshot of a set of member storage blocks selected from said plurality, said member storage blocks forming a consistent file system other than an active file system;

said snapshot being represented as an object in said file system and having a set of storage blocks for recording said snapshot;

whereby a backup and restore operation on said file system has the property of preserving said snapshot within said file system.

Lorie is not seen by Applicants to disclose or to suggest the foregoing features of claim 114, at least with respect to "said snapshot being represented as an object in said file system."

Lorie concerns a database system. The Office Action apparently has broadly read the database system to be equivalent to the claimed file system. The Office Action apparently has also read Lorie's "state of integrity" to be equivalent to the claimed snapshot. Applicants respectfully submit that given these equivalences, Lorie would have to teach that its "state of integrity" is represented as an object in Lorie's database in order to teach the claimed feature of "said snapshot being represented as an object in said file system." Applicants see no such teaching in Lorie.

For at least the foregoing reasons, claim 114 is believed to be allowable over Lorie.

Reconsideration and withdrawal are therefore requested of the rejections of this claim.

Claims 115 to 120: These claims have been rejected, rendering the rejections thereof

moot.

Claims 121 to 130: Claim 121 is reproduced below.

121. (Currently Amended) A file system that stores and retrieves information in a plurality of storage blocks, including a data structure including a shadow snapshot of a set of member storage blocks selected from said plurality, said member storage blocks having formed a consistent file system other than an active file system, with a set of selected member storage blocks removed from said consistent file system;

103.1068.01

09/854,187

wherein said shadow snapshot is disposed as a single object in said file system, whereby said file system can manipulate said snapshot without having to traverse a hierarchy of file system objects within said snapshot.

Lorie is not seen by Applicants to disclose or to suggest the foregoing features of claim 121, at least with respect to "said shadow snapshot is disposed as a single object in said file system."

Lorie concerns a database system. The Office Action apparently has broadly read the database system to be equivalent to the claimed file system. Applicants are unsure of exactly what feature of Lorie's database system is being equated with the claimed shadow snapshot. Nonetheless, Applicants certainly do not see any teaching of disposing a shadow snapshot or its equivalent as a single object in Lorie's database. Thus, Lorie is not seen by Applicants to teach that "said shadow snapshot is disposed as a single object in said file system."

For at least the foregoing reasons, claim 121 and its dependent claims are believed to be allowable over Lorie. Reconsideration and withdrawal are therefore requested of the rejections of those claims.

Claims 131 to 140. Claim 131 is reproduced below.

131. (Currently Amended) A file system that stores and retrieve information in a plurality of storage blocks including a data structure that includes a mark on allocate image of a set of member storage blocks selected from said plurality, said member storage blocks having been added to a snapshot that originally formed a consistent file system;

wherein said mark on allocate storage image is disposed as a single object in said file system, whereby said file system can manipulate said snapshot without having to traverse a hierarchy of file system objects within said snapshot.

103.1068.01

09/854,187

Lorie is not seen by Applicants to disclose or to suggest the foregoing features of claim 131, at least with respect to "said mark on allocate storage image is disposed as a single object in said file system."

Lorie concerns a database system. The Office Action apparently has broadly read the database system to be equivalent to the claimed file system. The Office Action apparently has also read Lorie's "state of integrity" to be equivalent to the claimed storage image. Applicants respectfully submit that given these equivalences, Lorie would have to teach that its "state of integrity" is disposed as a single object in Lorie's database in order to teach the claimed feature that "said mark on allocate storage image is disposed as a single object in said file system." Applicants see no such teaching in Lorie.

For at least the foregoing reasons, claim 131 and its dependent claims are believed to be allowable over Lorie. Reconsideration and withdrawal are therefore requested of the rejections of those claims.

Claims 141 to 147: Claim 141 is reproduced below.

141. (Currently Amended) A file system that stores and retrieve information in a plurality of storage blocks including a data structure that includes a mark on deallocate image of a set of member storage blocks selected from said plurality, said member storage blocks having been removed from a snapshot that originally formed a consistent file system;

wherein said mark on deallocate storage image is disposed as a single object in said file system, whereby said file system can manipulate said snapshot without having to traverse a hierarchy of file system objects within said snapshot.

103.1068.01

09/854,187

Lorie is not seen by Applicants to disclose or to suggest the foregoing features of claim 141, at least with respect to "said mark on deallocate storage image is disposed as a single object in said file system."

Lorie concerns a database system. The Office Action apparently has broadly read the database system to be equivalent to the claimed file system. The Office Action apparently has also read Lorie's "state of integrity" to be equivalent to the claimed storage image. Applicants respectfully submit that given these equivalences, Lorie would have to teach that its "state of integrity" is disposed as a single object in Lorie's database in order to teach the claimed feature that "said mark on deallocate storage image is disposed as a single object in said file system." Applicants see no such teaching in Lorie.

For at least the foregoing reasons, claim 141 and its dependent claims are believed to be allowable over Lorie. Reconsideration and withdrawal are therefore requested of the rejections of those claims.

Closing

In view of the foregoing amendments and remarks, the entire application is believed to be in condition for allowance, and such action is respectfully requested at the Examiner's earliest convenience.

103.1068.01

09/854,187

Applicants' undersigned attorney can be reached at (614) 486-3585. All correspondence should continue to be directed to the address indicated below.

Respectfully submitted,



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